IN THE CLAIMS

Claims 1-55 were cancelled without prejudice or disclaimer of the subject matter thereof.

New Claims 56-75 were previously added.

Please amend Claim 56, without prejudice or disclaimer of the subject matter thereof, as follows:

56. (Presently Amended) A method for detecting a SNP or ~~an~~ single base pair insertion or deletion ~~of 1 to 4 base pairs~~ in a double-stranded test DNA molecule, comprising:

(a) providing a single stranded or double stranded DNA probe which probe is optionally detectably labeled, and which probe has (i) a known nucleotide sequence or (ii) a sequence complementary to the sequence of at least a part of the test DNA;

(b) contacting the probe, after denaturation in the case of a double stranded probe, with a RecA protein which is optionally detectably labeled, to form a RecA filament or filaments;

(c) contacting the RecA filaments with the test DNA, thereby forming

(i) a three stranded DNA D-loop structure, in the case of the single stranded probe or (ii) a four stranded DNA structure in the case of the double stranded probe,

in the test DNA, which structure comprises the probe strand or strands annealed with the test DNA strands;

d) contacting the DNA structure with a MutS protein which is optionally detectably labeled and optionally immobilized, wherein the MutS binds to one or more base pair mismatches or unpaired bases present in the three stranded ~~D-loop structure~~ or in the four stranded portion of the DNA structure formed by RecA;

(e) detecting the presence of MutS bound to the DNA structure, or the probe DNA or RecA bound to immobilized MutS,

wherein the presence of probe DNA or RecA bound to the MutS is indicative of the presence of the SNP or single base pair insertion or deletion in the test DNA, and

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wherein a positive signal is generated only when two or more components are co-localized, thus allowing detection of a SNP or a single base pair insertion or deletion in a double-stranded test DNA molecule.

57. (Previously Presented) The method of claim 56, wherein the test DNA molecule is selected from the group consisting of prokaryotic genomic DNA, eukaryotic genomic DNA, cDNA, viral DNA, plasmid DNA, and a DNA fragment amplified by PCR or by another amplification method.

58. (Previously Presented) The method of claim 56, wherein the probe is selected from the group consisting of:

(a) a synthetic oligonucleotide;

(b) a recombinant oligonucleotide;

(c) an oligonucleotide obtained by denaturing, and, optionally cleaving, a double stranded DNA molecule.

59. (Previously Presented) The method of claim 58, wherein the oligonucleotide has a length of about 20 to about 60 nucleotides.

60. (Previously Presented) The method of claim 56, wherein:

(i) the probe and the MutS are labeled;

(ii) the label is a fluorophore, a chromophore, a radionuclide, biotin or digoxigenin; and

(iii) association of the probe label with the MutS label is indicative of the presence of the SNP or single base pair insertion or deletion in the test DNA.

61. (Previously Presented) The method of claim 56, wherein the RecA protein is from E. coli.

62. (Previously Presented) The method of claim 56, wherein

(i) the RecA and MutS are labeled;

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(ii) the label is a fluorophore, a chromophore, a radionuclide, biotin or digoxigenin; and

(iii) association of the RecA label with the MutS label is indicative of the presence of the SNP or single base pair insertion or deletion in the test DNA.

63. (Previously Presented) The method of claim 56 wherein the MutS is immobilized to a solid support.

64. (Previously Presented) The method of claim 56 wherein the MutS is detectably labeled, and the detectable MutS label is a fluorophore, a chromophore, a radionuclide, biotin, digoxigenin, a detectably labeled bead, a detectably labeled anti-MutS antibody, or a combination of an unlabeled anti-MutS antibody and a detectably labeled secondary antibody specific for the anti-MutS antibody.

65. (Previously Presented) The method of claim 56 wherein the RecA protein is labeled and the detection is of the MutS label associated with the RecA label present in the DNA structures.

66. (Previously Presented) The method of claim 56, wherein the RecA protein is labeled and the detectable label is in the form of a detectably labeled primary anti-RecA antibody, or a combination of an unlabeled anti-RecA antibody and a detectably labeled antibody specific for the anti-RecA antibody.

67. (Previously Presented) The method of claim 56, wherein one or more of the detectably labeled probes, the detectably labeled RecA and the detectably labeled MutS is labeled with a fluorophore.

68. (Previously Presented) The method of claim 56, where detection is by flow cytometry.

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69. (Previously Presented) The method of claim 41 where detection is by flow cytometry.

70. (Previously Presented) The method of claim 56 wherein detection is by flow cytometry which detects the coincidence of two-or three labels which are bound to:

(a) MutS and the probe;

(b) MutS and RecA; or

(c) MutS, RecA and the probe.

71. (Previously Presented) The method of claim 56 wherein the probe is labeled by polymerase extension using labeled deoxynucleotide triphosphates or nucleotide terminators.

72. (Previously Presented) The method of claim 56, wherein the test DNA is immobilized to a solid support.

73. (Previously Presented) The method of claim 56, wherein the probe is bound to an adduct that allows immobilization of the probe following formation of the D-loop structure or the four-stranded DNA structure.

74. (Previously Presented) The method of claim 73, wherein the adduct is an oligonucleotide.

75. (Previously Presented) The method of claim 73, wherein the adduct is biotin or digoxigenin.

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